

Nonindigenous Fishes Program

The Florida Caribbean Science Center (FCSC) has a long history of providing information and carrying out field and laboratory research on nonindigenous fishes. Research emphasis has been on Florida, which has more nonindigenous fishes than any other state in the eastern United States and is near the top of the list (along with California and Hawaii) of states with the most nonindigenous fishes.



Sampling nonindigenous fishes in South Florida.

Invasive nonindigenous species are important because they threaten native communities, alter habitats, and can have significant economic impacts. In aquatic environments, invasive species can be especially noxious because native species have few options for escaping direct interactions such as predation and competition for habitat and food.

The study of nonindigenous fishes in Florida is complex. The kinds and numbers of nonindigenous fishes constantly changes. New nonindigenous fishes are introduced to the region's waters each year and already-established invasive

fishes continually expand their ranges. Furthermore, assessing the effects of a new invader on native species and environments is complicated by the fact that most habitats are under stress as a result of human disturbance and because many sites are already populated by other introduced species.

Program Goals

The goal of the Nonindigenous Fishes Program is to fill critical information gaps concerning the pathways of introduction and invasion, distribution, status, environmental biology, and effects of nonindigenous fishes. Important species, from both a biological and economic perspective, are targeted for study and monitoring, with special emphasis on those that have great potential to negatively effect native species and environments. Research results are intended to provide information critical to successful control and management of harmful nonindigenous species, as well as for assessing risks associated with species being considered for introduction.



Young Asian Swamp Eels (*Monopterus* sp.)



A Florida introduction, the Yellowbelly Guapote (*Cichlasoma salvini*)

Projects

Fish Communities and Swamp Eel Populations of South Florida Canal and Stream Ecosystems as Indicators of Habitat Quality and Restoration Success

Fishes are essential components in the South Florida ecosystem for a variety of reasons (e.g., as food for humans and other organisms). Nonindigenous fishes are a relatively new component of the South Florida ecosystem. Some are potential threats, particularly those that are highly predatory or competitive. During the past century, at least 20 foreign fishes have become established in South Florida. One recent invader is the Asian Swamp Eel (*Monopterus* sp.). Our field data has demonstrated that the eel is locally abundant and reproducing in three Florida drainages, including two canal systems in South Florida. Nonindigenous fishes are closely associated with disturbed habitats (e.g., canals) and their numbers seem to be positively correlated with level of disturbance. If these relationships are shown to exist throughout

South Florida, then nonindigenous species may serve as important indicators of ecosystem health and as useful predictors of the success of Everglades restoration activities.

Influence of Hydrology on Life-History Parameters of Common Freshwater Fishes from Southern Florida

Fishes are essential to the successful functioning of wetland food webs in the South Florida ecosystem through their roles as prey and predators. Any changes that reduce the population sizes, community composition, or availability of aquatic animals will affect all facets of the ecology of these wetlands. For this reason, fishes have been recognized by the multi-agency groups responsible for guiding the Everglades restoration process as a key indicator group by which to measure restoration success. Despite the

importance of fish for management, gaps in baseline knowledge remain. As a component of a larger investigation, FCSC scientists are carrying out field and laboratory research to document the life-history parameters (i.e., growth rate, age at maturation, fecundity and life expectancy) for common native and nonindigenous fishes. This information will be useful for development of predictive models associated with the Everglades restoration effort and also to evaluate alternative management scenarios.

Identification, Distribution, and Environmental Biology of Cichlids and Armored Catfishes in Florida.

In peninsular Florida as many as 18 species of introduced cichlids (e.g., tilapias) and several species of South American armored catfishes are abundant and widespread in artificial and

prevention, containment, and control. This project is intended to provide resource managers and others with practical information on guides to nonindigenous fishes and detailed information on their invasive pathways, current distributions, and critical biological and life history data.



The Black Carp (*Mylopharyngodon piceus*)

Risk Assessment of Nonindigenous Fishes: Asian Swamp Eel and Black Carp

During the past four years, three separate populations of the Asian Swamp Eel have been discovered in peninsular Florida. The most recent was a genetically distinct population found in canals close to the eastern boundary of Everglades National Park. Unlike most foreign fishes introduced to peninsular Florida, in its native range the swamp eel is not restricted to tropical areas. Given sufficient time, the eel potentially may colonize other regions of the U.S. In 2000, FCSC scientists were asked to complete a risk assessment on the swamp eel. Gathering and evaluating all existing biological information is an important step in assessing risks associated with a species' introduction and spread. In 1996, as a test case, FCSC scientists completed a risk assessment on the Black Carp (*Mylopharyngodon piceus*), a large mollusk-eating cyprinid from eastern Asia. Risk assessments provide important information to decision makers, especially due to the fact that the Asian Swamp Eel and the Black Carp are being considered for national listing as aquatic nuisance species.

